Body Imaging

In the mid-1960s, as a prelude to NASA's Apollo Lunar Landing Program, Jet Propulsion Laboratory (JPL) developed the technology known as digital image processing to allow computer enhancement of Moon pictures. This technology became the basis for the NASA Landsat series of Earth resources survey satellites, which classify and distinguish among surface features by analyzing Earth objects' radiation signatures.

Digital image processing has found a broad variety of other applications, particularly in the field of medicine, where it is employed to create and enhance images of the organs in the human body for diagnostic purposes.

Among advanced body imaging techniques are computer-aided tomography, also known as CT or CATScan, and Magnetic Resonance Imaging (MRI). CT image data is collected by irradiating a thin slice in the body with a fan-shaped x-ray beam from a number of directions around the perimeter of the body; a tomographic (slice-like) image is reconstructed from these multiple views by a computer. MRI is an imaging technique that employs a magnetic field and radio waves to create images, rather than x-rays.

MRI and CT images are often complementary. In most cases, MRI is good for viewing soft tissue but not bone, while CT images are good for bone but not always good for soft tissue discrimination.

Physicians and engineers in the Department of Radiology at the University of Michigan Hospitals, Ann Arbor, Michigan are developing a technique for combining the best features of MRI and CT scans to increase the accuracy of discriminating one type of body tissue from another. One of their research tools is a computer program originally developed to distinguish among Earth surface features in Landsat image processing.

Called HICAP, the program can be used to distinguish between healthy and diseased tissue in body images. At near right is a CT image of a slice of human liver with many lesions; it was analyzed and processed by HICAP to produce the image at far right, in which the false-color red

areas represent regions of normal liver. Consecutive liver slices can be processed in this manner to produce a three-dimensional display of the liver.

HICAP was supplied to the Department of Radiology by NASA's Computer Software Management and Information Center (COSMIC)[®]. Located at the University of Georgia, COSMIC makes available to industrial and other organizations government-developed computer programs that have secondary applicability.



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